ETA Series
700VA to 3KVA Models

Uninterruptible Power Systems (UPS)

Part Number : _____

Serial Number : _____

INDEX

1. GENERAL SAFETY AND OPERATIONAL INFORMATION 3
1.1 General Safety 3
1.2 Operational Performance 4
1.3 General Operating Description 4
1.4 Front Panel LED Indicators 4
1.5 Rear Panel 7

2. INSTALLATION 8
2.1 Installation and Configuration 8

3. POWERING THE LOAD 9
3.1 Turning ON the UPS When Mains Power is Present 9
3.2 Turning ON the UPS from the Battery When Mains Power is Not Present 9
3.3 Turning OFF the UPS 9

4. OPERATING STATUS 10
4.1 UPS Operation 10
4.2 Operating Modes: 11
4.2.1 Normal Mode 11
4.2.2 By-pass Mode 11
4.2.3 Battery Mode 11
4.3 Error Conditions: 11
4.3.1 Overload 11
4.3.2 Mains Supply out of Tolerance 12
4.3.3 Over Temperature 12
4.3.4 Battery Exhausted 12

5. COMMUNICATION INTERFACE 13
5.1 Communication Serial Port 13

6. PROBLEM SOLVING 14
6.1 Common Questions 14

7. PRODUCT SPECIFICATIONS 16
7.1 UPS Sizing 16
7.2 Technical Data 17

1. GENERAL SAFETY AND OPERATIONAL INFORMATION

1.1 General Safety

Please note the following recommendations and guidelines for the safe operation of your Elite UPS.

(a) All maintenance and service functions must be performed by authorised personnel. The UPS contains several internal power sources, which can be hazardous.

(b) The internal battery can generate an electric shock. All batteries removed from the UPS for replacement, must be disposed of according to the current health and safety regulations. **DO NOT** throw batteries into a fire: they might explode. **DO NOT** attempt to open the batteries: they are sealed lead acid maintenance-free. The acid electrolyte can harm unprotected skin and eyes.

(c) The UPS contains its own energy source (the battery). The output power sockets may be live, even when the UPS is not connected to a power source.

(d) **DO NOT** operate the UPS if it is appears to be leaking battery electrolyte, or if a dry white power residue is present on the batteries.

(e) The detachable power cable is intended to serve as a disconnection device. Make sure that the cable connection to the rear of the UPS is easily accessible.

(f) **DO NOT** allow water near the UPS. **DO NOT** place a foreign object inside the UPS.

(g) The UPS generates approximately 1mA of leakage current. To ensure a safe maximum limit of 3.5mA, limit the total leakage current of the loads to a maximum of 2.5mA. Should the load leakage current be over this limit, a qualified electrician should install the UPS in compliance with IEC 309. An industrial type plug must be used for connection to the mains supply.

(h) In emergencies disconnect the power cable from the wall outlet and turn off the UPS using the rear ON/OFF switch.

1.2 Operational Performance

The Elite UPS incorporates the following features:

- ON LINE double conversion system providing total protection to the load.
- Built-in by-pass for high start up loads and UPS fault conditions.
- Input power factor correction providing a sine wave input current in phase with the mains supply.
- Wide input voltage range to reduce battery operation.
- Microprocessor control.
- IGBT switching power devices.
- Energy saving operation with extra high efficiency.
- Remote control capability.
- UPS monitoring and management software programmable from a standard DOS PC.
- Conformity to the latest norms concerning safety and electromagnetic compatibility.
- Programmable weekly turn on/turn off cycles.
- Stand-by operation capability to further improve efficiency.

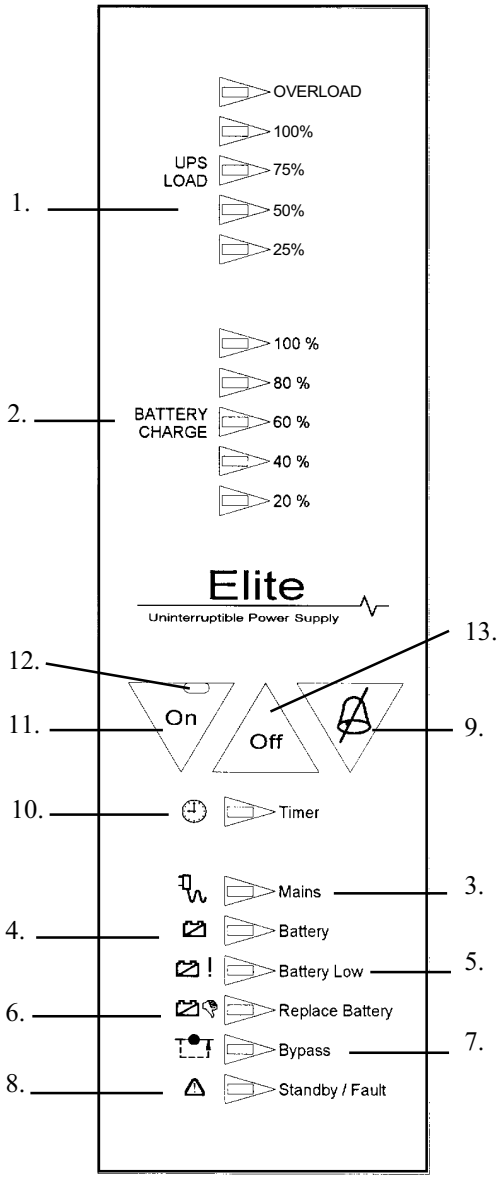
1.3 General Operating Description

Elite UPS are designed to provide a computer-grade, voltage and frequency stable supply to the protected loads, under all mains conditions.

During normal operation, when mains is present and stable, the UPS provides a pure sine-wave to the protected load. The batteries are charged and monitored by the built-in microprocessor. The microprocessor also monitors other parameters such as mains voltage, frequency, inverter voltage and frequency, load conditions and temperature.

1.4 Front Panel LED Indicators

The front panel LED indicators provide a quick assessment of the UPS, load and battery status. They indicate in which mode the UPS is working (on mains, battery or by-pass) and shows the load and battery charge states as a percentage of the overall capacity.



1. LED Bar of Load Applied
2. LED Bar of Battery Charge
3. Line Present
4. Battery Working
5. Battery Low
6. Replace Battery
7. Load on By-pass
8. Fault / Stand-by
9. Silence Push-button
10. Timer On
11. ON Push-button
12. UPS ON
13. OFF Push-button

(1) LED Bar of Load % Used: The bar has 5 LEDs *(3 green, 1 yellow & 1 red)* which indicates the power supplied by the UPS. Each lit LED corresponds to a 25% increase in load applied. The last LED *(red)* lights when an overload condition occurs *(i.e. at load > 100%)*.

(2) LED Bar of Battery Charge % Available: The bar shows the battery charge level. It has 5 green LEDs . Each lit LED represents a 20% increase in battery charge level available. If the built-in microprocessor detects a condition of battery overcharge, the complete bar blinks and the buzzer sounds an audible alarm. The alarm will sound for 4 seconds bursts at 1 second intervals.

The Battery Charge % bar can also indicate the mains voltage available when the Alarm Silence push-button is pressed.

	LED1	LED2	LED3	LED4	LED5
Mains	>190V	>200V	>230V	>250V	>260V

(3) "MAINS PRESENT" LED *(green)***:** The LED indicates that mains voltage is available and its value is above 170V. When the UPS is switched on with mains present, the LED flashes until the output voltage from the inverter is in phase with the mains voltage.

(4) "BATTERY WORKING " LED *(yellow)***:** The LED indicates that energy is being drawn from the battery due to a power failure (mains is not available or is below 170V).

(5) "BATTERY LOW" LED *(yellow)***:** The LED indicates that there is approximately 2 minutes of battery runtime available. Provided that the power management software is installed, the load will start to shutdown open operations.

(6) "REPLACE BATTERY" LED *(red)***:** The LED indicates that the batteries need to be replaced. The UPS performs a battery test every 40 hours and measures their ability to maintain the charge.

(7) "LOAD ON BY-PASS" LED *(green)***:** The LED indicates that power is being supplied to the load from the mains supply.

(8) "FAULT /STAND-BY" LED *(red)***:** When the LED blinks, the UPS is in stand-by mode. When lit the LED indicates that the UPS is locked to bypass. Press the "OFF" button to reset the lock.

(9) "SILENCE" PUSH-BUTTON: This button allows the user to silence the audible alarm in two cases:

1. The UPS is in battery operation ("Battery Working" LED is lit).
2. The UPS is performing a countdown final procedure due to operation on low battery condition or as part of a scheduled shutdown.

The alarm is reset, if during battery operation:

1. Mains power returns to normal
2. The remaining back-up time is almost exhausted ("Low battery" LED is lit)

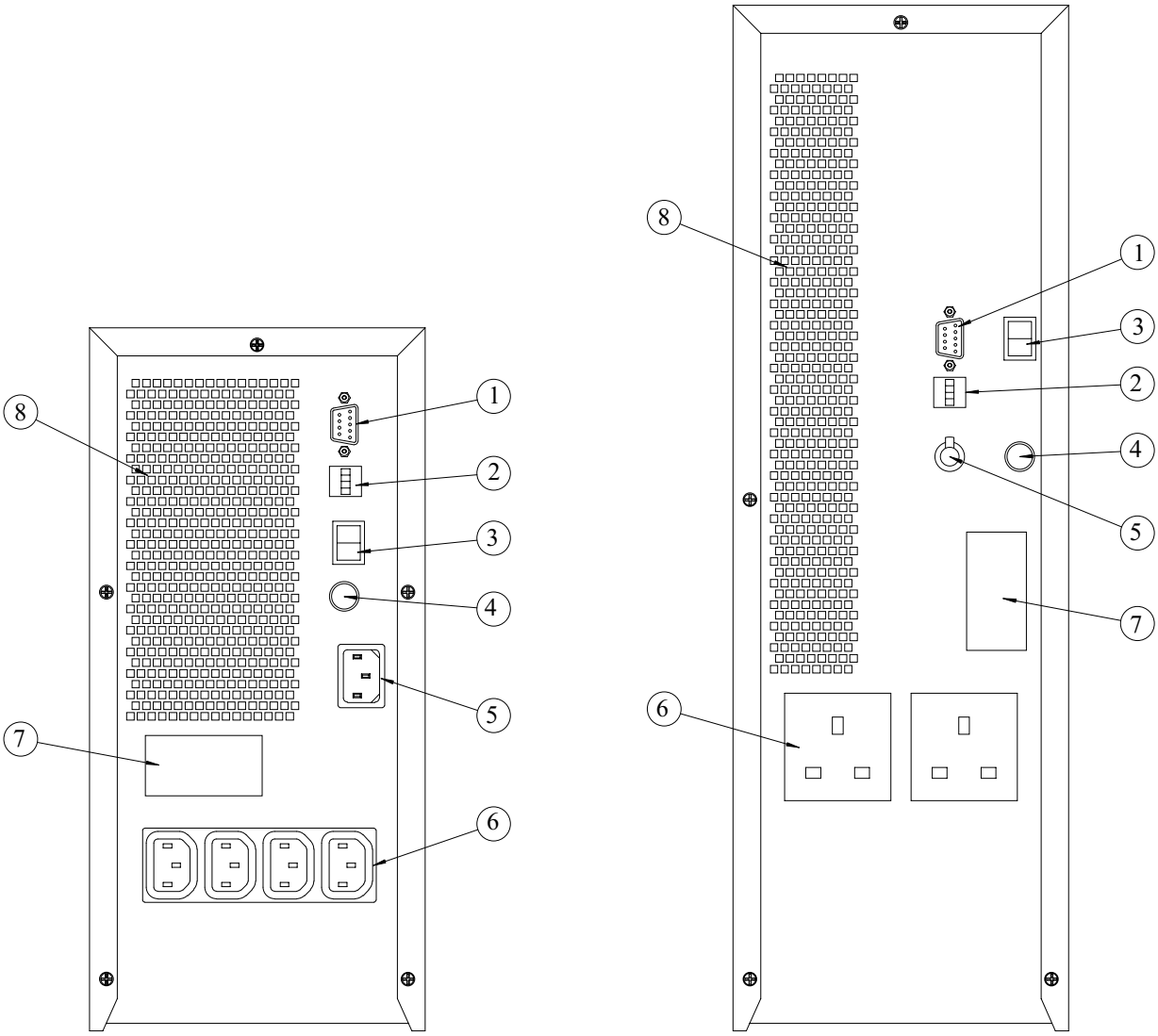
(10) "TIMER ON" LED *(green)***:** Refer to the software manual.

(11) "ON" PUSH-BUTTON: Turns the UPS on.

(12) "UPS ON" LED *(green)***:** The LED indicates that power is being supplied to the load.

(13) "OFF" PUSH-BUTTON: Turns the UPS off. If mains is available the UPS goes into stand-by mode. If mains is not available and the timer is not activated, the UPS remains in the "OFF" mode.

1.5 Rear Panel



1. Serial port with RS232 and volt-free contact pins
2. Dip switches
3. ON/OFF DC switch
4. Mains Fuse
5. Mains connection
6. Output sockets
7. Battery Extension socket
8. Ventilation Slot

2. INSTALLATION

2.1 Installation and configuration

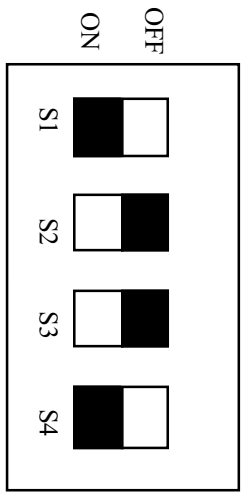
Please read carefully the following instructions before UPS installation and mains connection:

1. Place the UPS on a flat and stable surface.
2. Avoid placing the UPS in direct sunlight or hot air.
3. Keep ambient temperatures between 0°C and 25°C to prevent poor battery performance .
4. Relative room humidity must be lower than 90%.
5. Avoid dusty areas.
6. Take care to place the UPS at least 50mm away from surrounding walls and do not cover the ventilation slots.
7. Avoid placing heavy objects on the UPS or the mains or load cables.
8. The length of the cable connecting the equipment to the UPS must not be over 10 metres.

The UPS is supplied as a 230V/50Hz UPS. However it is possible to change this setting by using the rear panel dip switches.

	S1	S2	S3	S4
220V			X	X
230V			OFF	ON
240V			ON	OFF
50Hz		OFF		
60Hz		ON		
1200b/s	OFF			
9600b/s	ON			

S1: Baud rate selection
S2: Frequency selection
S3-S4: Voltage Selection
X: S3-S4 both ON or OFF



Dip-switch settings

IMPORTANT NOTE: Any modification on the dip switch setting must be carried out with the UPS off: See section 3.3.

3. POWERING THE LOAD

3.1 Turning ON the UPS When Mains Power Is Present

1. Connect the power cable to the UPS.
2. Plug the power cable into the mains outlet.
3. Turn the rear panel switch to “ON”. After a few seconds the UPS turns on and the “Locked / Stand-by” LED on the front panel starts blinking. The UPS is in stand-by mode: this means that the UPS has a very low power consumption. The Microprocessor is powered and is performing control and self-diagnostic procedures: the battery is being charged; The UPS also works in stand-by mode during battery operation provided the timer is activated.
4. Plug the loads into the sockets on the rear of the UPS.
5. Turn on the UPS by pressing the “ON” button. After pressing the button, all LEDs on the front panels light up for approximately 1 second and the UPS sounds a beep.
6. Turn on the loads connected to the UPS. After approximately 30 seconds make sure the UPS is working properly: simulate a mains failure by unplugging the UPS power cable from the socket. The load continues to be powered; the “Battery working” LED on the front panel lights and the audible alarm sounds every 7 seconds. The UPS should return to normal operation by reconnecting the mains cable.

3.2 Turning ON the UPS from The Battery When Mains Power Is Not Present

1. Plug the loads into the socket on the rear of the UPS.
2. Turn the rear panel switch to “ON”.
3. Turn on the UPS holding the “ON” button pressed for at least 5 seconds. After pressing the button, all LEDs on the front panel should light up for approximately 1 second and the buzzer sounds a beep every 7 seconds.
4. Turn on the loads connected to the UPS.

3.3 Turning OFF the UPS

(a) In Normal Operation: Hold the “OFF” button for at least 0.5 seconds to turn the UPS off. The UPS switches over to stand-by operation, the “Locked / Stand-by” LED blinks. Turn the rear panel switch to "OFF". If necessary remove the power cable from the mains socket.

(b) In Battery Working Mode: If the UPS is operating from battery or if the timer has been set, hold the “OFF” button pressed for at least 0.5 seconds to turn the UPS off. Turn the rear panel switch to "OFF" to prevent the UPS from starting up on battery.

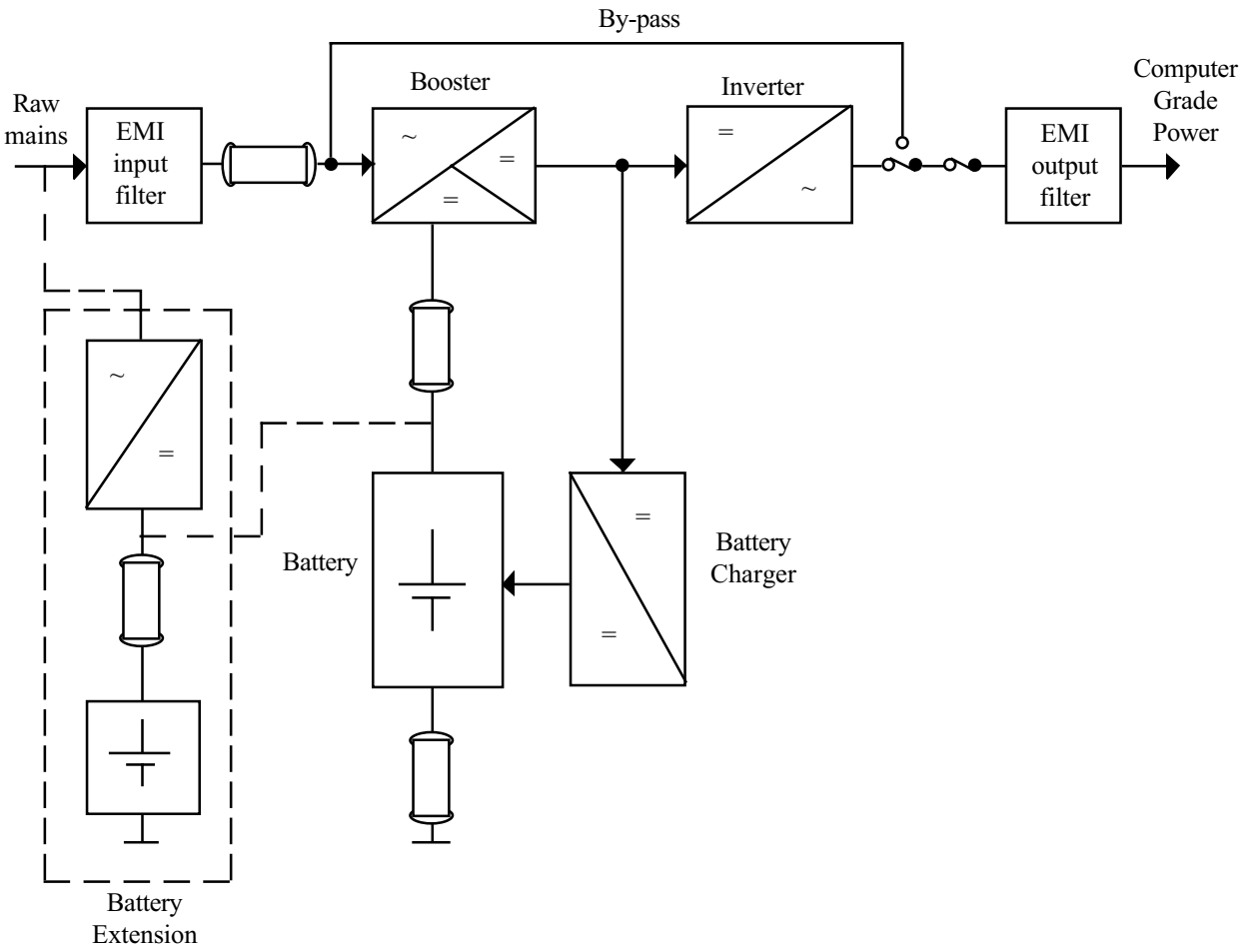
NOTE 1: *If the timer is activated hold the “OFF” button pressed for at least 5 seconds to turn the UPS off.*

NOTE 2: *If you do not use your equipment over a long period, it is advisable to turn the UPS off using the rear panel switch and to remove the power cable from the mains socket.*

4. OPERATING STATUS

4.1 UPS Operation

The following block diagram shows the essential components of the UPS. Please refer to this diagram whilst reading the next sections.



UPS Block Diagram

4.2 Operating Modes

4.2.1 "NORMAL" Mode

In this operating mode the UPS draws power from the mains supply. The UPS output is powered by the inverter (refer to block diagram) and batteries are charged.

4.2.2 "BY PASS" Mode

Bypass operation occurs under the following conditions:

(a) On UPS start-up with mains available: The UPS output is transferred to bypass and the load is powered by the mains. This enables the UPS to cope with high in-rush currents from large loads. During this period the microprocessor brings the inverter output in phase with the mains.

(b) Inverter Overload: The inverter will continue to supply power to the load when a temporary overload condition occurs lasting less than 3 seconds. Over this period, the inverter automatically protects itself and the UPS output is automatically transferred over to the bypass supply.

(c) Inverter Voltage Out Of Tolerance: Should a fault occur with the inverter section which drives its output out of tolerance, the UPS output is automatically transferred over to the bypass supply.

(d) Inverter Failure: Should a serious fault occur with the inverter, preventing inverter operation, the UPS output is automatically transferred over to the bypass supply.

NOTE 1: *The UPS switches over to bypass operation in correspondence with the following condition: 180Vac < Vin < 260Vac.*

4.2.3 "Battery" Mode

Battery operation occurs when mains is not available (brown-outs or black-outs), or is below 170V. During battery operation the buzzer sounds a beep every:

7 seconds during regularly operation.
2 seconds when the battery approaches exhaustion.

Two minutes before the battery capacity runs out the yellow "BATTERY LOW" LED lights up. If the power management software is installed, the UPS initiates a controlled system shutdown.

4.3 ERROR CONDITIONS

The UPS is designed to provide reliable automatic protection for the load. The following conditions require immediate investigation when the UPS sounds an alarm:

4.3.1 Overload

An overload condition occurs when the protected load requires more power than the UPS is able to supply. Under this condition the overload LED (red) on the load LED bar lights up and the alarm sounds a constant tone.

If such an alarm condition occurs, turn off the UPS (front panel OFF button), reduce the load applied and turn on the UPS again (front panel ON button).

4.3.2 Mains Supply Out of Tolerance

The UPS is designed to operate on a wide input voltage range. This allows the UPS to reduce battery operation, saving it's battery charge for actual mains failures.

The microprocessor constantly checks the input voltage and frequency to guarantee operation within a wide operating range. Outside of these limits, the UPS will not switch over to bypass mode should an overload or UPS fault occur.

4.3.3 Over Temperature

If the internal temperature exceeds the preset values, the UPS activates its built-in protection and locks out any function. Under this condition the “Locked / stand-by” LED lights up and the alarm sounds a constant tone. Should this occur:

(a) Turn the UPS off (front panel OFF button).
(b) Disconnect the load.

Then check that:

(c) the load applied is not greater than the rating of the UPS.
(d) the ambient temperature is not over 40^{o}C.
(e) no heat sources are next to the UPS.
(f) the UPS is placed at least 50mm away from the surrounding walls and that the ventilation slots not blocked.

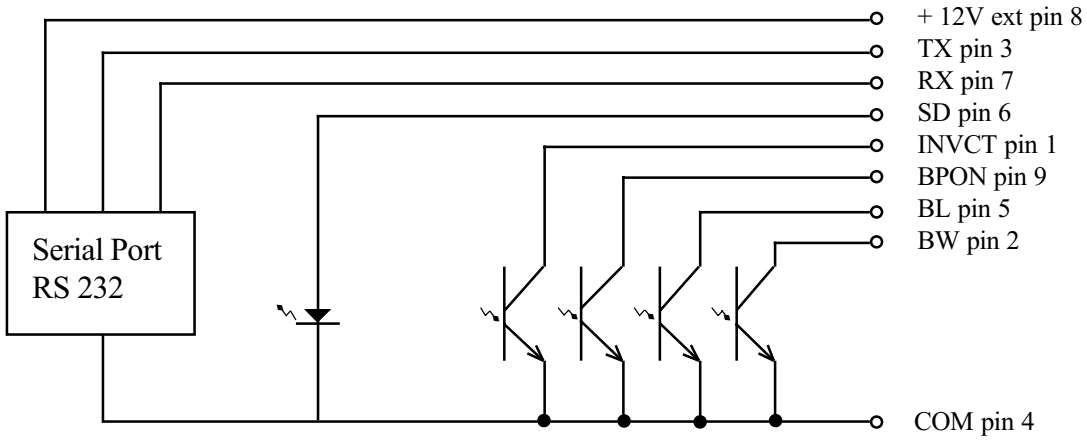
4.3.4 Battery Exhausted

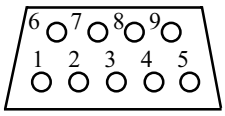
The microprocessor performs periodic battery efficiency tests. If the battery efficiency is less than 60%, the "Replace Battery" LED lights.

5. COMMUNICATION INTERFACE

5.1 Communication Serial Port

The UPS is equipped with a 9-way interface providing RS232 and volt-free contact signals.





D9 pin female

(a) "SD" shutdown signal to turn off the UPS through the PC: +(5/15)VDC for at least 3 seconds.

(b) "INVCT" inverter connection signal: contact is closed when the UPS output is switched over to the inverter.

(c) "BPON" by-pass signal: contact is closed when the UPS output is switched over to the bypass.

(d) "BL" low battery signal: contact is closed 2 minutes before the back-up time is over.

(e) "BW" battery working signal: contact is closed when the UPS is on battery operation.

NOTE 1: *Do not exceed the following limits for each contact: +30VDC / 10mA.*

NOTE 2: *The "SHUT DOWN" signal has to keep a high value for at least 3 seconds to turn off the UPS.*

NOTE3: *Interface operation is possible only if there is +(10/15) DC voltage between pins 8 and 4.*

6. PROBLEM SOLVING

6.1 Common Questions

> The UPS does not switch over to stand-by operation ("Locked / Stand-by LED does not blink, no beep is sounded)

POSSIBLE CAUSES:
1. The UPS is not properly plugged into the mains socket.
2. The socket to which it is connected does not provide mains voltage.
3. The Input fuse has blown.
4. The rear panel switch is in the OFF position.

SOLUTIONS:
1. Make sure that the plug is securely plugged into the mains socket.
2. Plug into a socket providing mains voltage.
3. Replace the input fuse with one of the same type.
4. Turn the rear panel DC switch to the ON position

> The UPS works in battery mode even if mains power is available:

POSSIBLE CAUSES:
1. Mains voltage is below 170V.
2. The Input fuse has blown.

SOLUTIONS:
1. None required. UPS operation is correct.
2. Replace the input fuse with one of the same type.

> Irregular buzzer activation:

POSSIBLE CAUSES:
1. The load oscillates around the maximum value admitted.

SOLUTIONS:
1. Reduce the load applied.

> Communication with the PC is faulty:

POSSIBLE CAUSES:
1. Incorrect baud rate.
2. The serial port chosen is already busy.
3. The interface connection is poor.

SOLUTIONS:
1. Select the proper baud rate (PC and UPS must have the same value).
2. Select a different serial port.
3. Make sure that the interface cable is not damaged and the UPS is properly connected to the PC.

> Back-up time shorter than expected:

POSSIBLE CAUSES:
1. The Battery is not fully charged.
2. The Load is too high.
3. The Battery needs replacing.

SOLUTIONS:
1. Start a battery charging procedure lasting 8 hours (UPS in stand-by mode).
2. Reduce the load and try again.
3. Replace the battery.

7. PRODUCT SPECIFICATIONS

7.1 UPS Sizing

Typical back-up time *(in minutes)* depending on the load applied (P.F. = 0.66):

LOAD (VA) (AH)	700VA (7AH)	700VA (14AH)	1KVA (7AH)	1K2VA (7AH)	1K5VA (7AH)	1K5VA (14AH)	2KVA (7AH)	2K5VA (7AH)	3KVA (7AH)
200	55	175	55	55	60	132	110	110	120
300	40	130	40	40	45	88	85	85	90
500	22	80	22	22	27	50	50	50	55
700	18	50	18	18	18	28	32	32	37
1000			10	10	13	18	22	22	27
1200				8	9	16	18	18	22
1500					8		15	15	17
2000							10	10	12
2500								8	10
3000									8

Typical power consumption figures

Type	**Nominal Power in VA**
Colour Monitor 14"	80
Colour Monitor 17"	100
Colour Monitor 19"/21"	150
Video Terminal	100
Colour Video Terminal 14"	150
Network Server w/o Monitor	300
Desktop 486 PC	200
Desktop Pentium PC	250
Tower 486 PC	300
Pentium Multimedia Tower PC	500
Workstation Unix	400
Matrix Printer 80 col.	70
Matrix Printer 136 col.	150
Laser Printer A3	1200
Laser Printer A4	900
IBM AS400 Model 9402	450
IBM AS400 Model 9404	650
IBM AS400 Mod. 9404 with expans	850
IBM AS400 Mod 9406 each Rack	1400
IBM advanced AS400 Mod 200	550
IBM advanced AS400 Mod 300	1100
IBM RISC 6000 Mod 320 w/o mon	350
IBM RISC 6000 Mod 520	520
IBM RISC 6000 Mod 530	550
IBM RISC 6000 Mod 540 "Power Server"	600
IBM RISC 6000 Mod 580	550

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7.2 Technical Data

Design Topology:	On-line, double-conversion (with energy saving option)
Input Voltage Window:	170-276V (220, 230, 240V nominal)
Input Frequency Window:	50Hz ±5% (60Hz)
Input Power Factor:	> 0.98
Input Current:	Sinusoidal (< 8% distortion)
Output Voltage:	230V ±1.5% (220/240V selectable)
Output Frequency:	50Hz (60Hz selectable)
Output Waveform:	Computer-grade sine-wave with less than 2% THD
Overload Capability:	200%
Crest Factor:	3:1
Bypass Voltage Range:	180-264V
Bypass Frequency Range:	±5Hz
Front Panel Controls:	ON, OFF and alarm silence push button
LED Indicators:	Load%, Battery Charge%, Mains present, UPS ON, On Battery, Low Battery, Replace Battery, On Bypass, Stand-by, Alarm Condition and UPS on Timer
Computer and Network Interface:	1x'D' 9way
SNMP Compliant:	Using optional adapter on the 'D' 9way port
Environmental Monitoring:	Using the 'D' 9way port
Volt-free Contacts:	Mains Fail, Low Battery, UPS Alarm, EPO and Bypass
RS232:	Using the 'D' 9way port
Alarm Indication:	LED, audible, volt-free contacts
Batteries:	Sealed lead acid maintenance free
Battery Recharge:	Typical recharge time 4-7hours
Operating Temperature:	0-40ºC
Humidity:	0-90% non-condensing
Audible Noise:	< 40dBA @ 1m
Mains Connection:	2m mains lead
Load Connection:	700VA-1K5VA 4xIEC sockets and 2KVA-3KVA 2xBS style sockets
Design Standards:	CE and EN50091